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State Aid to Consolidated Graded and Rural Schools

August first, Nineteen hundred and eleven

**Issued by the Department of
Education of North Dakota**

**KNIGHT PRINTING CO., FARGO
STATE PRINTERS**



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LAW PROVIDING FOR AID TO CONSOLIDATED, GRADED AND RURAL SCHOOLS.

Sec. 1. **Purpose.]** The purpose of this act shall be to aid, encourage, stimulate, and standardize the rural and smaller graded schools of this state and thereby increase the efficiency of the entire educational system of this state.

Sec. 2. **Graded, Consolidated and Rural Schools May Obtain State Aid.]** Any public school in any common school district in the state or any public school in any city, town or village, or any consolidated school in the state, not entitled to aid as a state high school, but fully complying with the conditions of this act relating to state graded schools and any public school in any common school district in the state not located in any incorporated city, town or village, or any consolidated school not entitled to state aid as a state high school or graded school, but fully complying with the conditions of this act relating to state rural schools, may receive aid as hereinafter provided for state graded schools and state rural schools.

Sec. 3. **Conditions To Be Complied With By State Graded Schools In Order To Obtain Aid.]** State graded schools shall be of two classes, first and second class. First class: In order to be entitled to aid as a state graded school of the first class, such school shall have complied with the following conditions, namely:

First, it shall have maintained for the school year next preceding that for which aid is granted at least nine (9) months school. Second, it shall be well organized, having at least four departments under the supervision of proficient teachers. The principal shall be a graduate of a normal school or other institution of higher learning or shall hold a state professional certificate and each department of such school shall be taught by a teacher having at least a first grade elementary certificate or better. Third, it shall have a suitable school building properly lighted, heated and ventilated, sanitary and commodious outhouses and other necessary accommodations, library and such other apparatus as is necessary to do efficient work. Fourth, such school shall have a regular and orderly course of study, and shall include the first two years of a high school course, as suggested by the state high school board as well as courses in domestic science, manual training and elementary agriculture

and shall comply with such rules as may be established by the state superintendent of public instruction.

Second Class: In order to be entitled to aid as a state graded school of the second class, such school shall have complied with the following conditions, viz:

First, it shall have maintained for the school year next preceding that for which aid is granted at least nine (9) months school. Second, it shall be well organized, having at least two departments under the supervision of proficient teachers. The principal shall be a graduate of a normal school or other institution of higher learning or shall hold a state professional certificate, and each department of such school shall be taught by a teacher having a first grade elementary certificate or better. Third, it shall have a suitable school building, properly lighted, heated and ventilated; sanitary and commodious outhouses and other necessary accommodations, a library and such other apparatus as is necessary to do efficient work. Fourth, such school shall have a regular and orderly course of study as prescribed in the state course of study for common schools, courses in domestic science, manual training and agriculture and shall comply with such rules as may be established by the state superintendent of public instruction.

Sec. 4. Conditions for Obtaining Aid as a State Rural School.] State rural schools shall be of two classes, first and second class.

First Class: In order to be entitled to aid as a state rural school of the first class, such school shall have complied with the following conditions, viz:

First: Such school shall have maintained during the school year next preceding that for which aid is granted at least nine (9) months school.

Second: It shall be taught by a teacher of successful experience, holding a first grade elementary certificate or better.

Third: It shall have a suitable school building, properly lighted, heated and ventilated; sanitary and commodious outhouses and other necessary accommodations, a library and such other apparatus as is necessary to do efficient work.

Fourth: Such school shall have a regular and orderly course of study prescribed in the state course of study for common schools, including elementary agriculture, and shall comply with such rules as may be established by the state superintendent of public instruction.

Second Class: In order to be entitled to aid as a state rural school of the second class such school shall have complied with the following conditions, namely:

First: Such school shall have maintained for the school year next preceding that for which aid is granted at least eight (8) months school.

Second: It shall be taught by a teacher of successful ex-

perience holding a second grade elementary certificate or better.

Third: It shall have a suitable school building, properly lighted, heated and ventilated, sanitary and commodious out-houses, and other necessary accommodations, library and such other apparatus as is necessary to do efficient work.

Fourth: Such school shall have a regular and orderly course of study as is prescribed in the state course of study for common schools, including elementary agriculture and shall comply with such rules, as may be established by the state superintendent of public instruction.

Provided, that for the purpose of this entire act, the primary certificate shall be considered as the equivalent of the first grade elementary certificate; further, that except in case of the principal teacher, the superintendent of public instruction may, in his discretion, recognize teachers holding second grade elementary certificates who have had five years of successful experience as eligible to teach in any of the schools contemplated by this act.

Sec. 5. Application to be Made to the County Superintendent of Schools.] Applications from schools for the aid herein provided in the case of both state graded and state rural schools shall be made to the county superintendent of schools of the county in which such schools are located. The county superintendent shall forward to the state superintendent of public instruction such applications as are endorsed and recommended by him, together with a certificate of the superintendent of the county wherein the school making such application is situated, to the effect that such school has fully complied with the conditions mentioned in section three (3) of this act in the case of state graded schools, and with the conditions mentioned in section four (4) of this act in the case of state rural schools.

Sec. 6 Inspection by Department of Public Instruction. Inspector of Rural and Graded Schools. Appointment. Salary and Expenses. Qualifications of Inspector.] Applications for aid of state graded schools or state rural schools which have the endorsement and recommendation of the superintendent of the county wherein such schools are located shall be filed in the office of the state superintendent of public instruction and prior to the apportionment of any aid, under the provisions of this act, shall be duly inspected by an officer of the department of public instruction known as the inspector of rural and graded schools. Such inspector shall be appointed by the state superintendent of public instruction for a term of two years and shall receive a salary of \$2,000 a year, together with his necessary and actual traveling expenses while in the active discharge of his duties. Such salary and expenses are to be paid out of the moneys appropriated for the purposes of this act upon presentation of vouchers properly verified and approved by the state superintendent of public instruction and filed with the state auditor. The inspector of rural

and graded schools shall have the educational qualifications required by law for state superintendent of public instruction of schools in this state.

Sec. 7. Amount of Apportionment.] Between the first of August and the first of September of each year, the state superintendent of public instruction shall apportion to each of said state graded schools which have fully complied with the provisions of this act and such additional rules as may be established by him, relating to state graded schools, the sum of one hundred fifty dollars in each year to state graded schools of the first class and to state graded schools of the second class the sum of one hundred dollars, and he shall apportion to each of the state rural schools which have fully complied with the provisions of this act and such additional rules as may be established by him relating to state rural schools, the sum of one hundred dollars in each year to each state rural school of the first class; and to each state rural school of the second class, the sum of fifty dollars in each year; provided, however, that in case the amount appropriated and available shall not be sufficient to pay the amounts specified above, then the amount available shall be apportioned pro rata among the schools entitled thereto and any moneys apportioned under this act shall be used solely to increase the efficiency of such schools. Provided, also, that but one school of each class in any township shall receive aid under the provisions of this act until all of those schools applying for aid before August first of each year are considered and disposed of.

Sec. 8 Additional Aid to Consolidated Schools.] Any consolidated school, meeting the requirements for a state graded school of the first class shall receive additional aid in the amount of one hundred dollars, and any consolidated school meeting the requirements for a state graded school of the second class shall receive additional aid in the amount of seventy-five dollars; further, any consolidated school, meeting the requirements for a state rural school of the first class shall receive additional aid in the amount of fifty dollars, and any consolidated school meeting the requirements for a state rural school of the second class shall receive additional aid in the sum of twenty-five dollars. A consolidated school, within the meaning of this act shall be one organized in accordance with section 832 of the Revised Codes of 1905.

Sec. 9. Records, Accounts and Rules.] The state superintendent of public instruction shall keep a record showing all schools applying for and receiving aid as state graded schools or as state rural schools in each year, and a detailed account of all moneys received by him and disbursed for such purposes. The state superintendent is also authorized to establish such additional rules as shall be found necessary to secure uniformity and the best results among the schools receiving state aid.

Section 10. Advancement of Graded Schools of the First Class to High Schools and Advancement of Graded Schools of the Second Class to Graded Schools of the First Class.]

First Class: When any state graded school of the first class in this state attains such a degree of proficiency as to satisfy the the inspector of rural and graded schools that it has the qualifications necessary to entitle it to be advanced to a state high school, such inspector may recommend the same to the state high school board for such advancement. If the state high school board is satisfied that such school has complied with all the requirements necessary to entitle it to promotion, said board may raise it to a state high school, entitling it to aid as such.

Second Class: When any state graded school of the second class in this state has attained such a degree of proficiency as to satisfy the inspector that it has the qualifications necessary to entitle it to be advanced to a state graded school of the first class such inspector may recommend the same to the state superintendent of public instruction for such advancement. If the state superintendent of public instruction is satisfied that such school fully complies with all the requirements necessary to entitle it to promotion, such superintendent may raise it to a state graded school of the first class, entitling it to aid as such.

Section 11. Report of State Superintendent of Public Instruction.] .. The state superintendent of public instruction shall include in his biennial report a comprehensive statement of all receipts and disbursements; the names and number of schools in each class receiving aid; the number of pupils attending the classes in each and the cost of supervision of all schools receiving aid under this act for the years covered by such report, to which may be added an estimate of appropriation needed to meet the requirements of this act for the succeeding two years and such other recommendations as he may deem useful and proper.

Section 12. Amount Appropriated for Each Class.] For the purpose of carrying out the provisions of this act the following sums are hereby appropriated annually, to be paid out of any moneys in the state treasury not otherwise appropriated, viz: For aid to state graded schools the sum of six thousand dollars (\$6,000) annually. For aid to state rural schools the sum of six thousand dollars (\$6,000) annually and for additional aid to state consolidated schools the sum of three thousand dollars (\$3,000) annually. For the inspector's salary as hereinbefore provided the sum of two thousand dollars (\$2,000) annually and for the actual and necessary traveling expenses of said inspector the sum of five hundred dollars (\$500) annually, which amounts, or so much thereof as is necessary, shall be paid upon the itemized vouchers, of the state superintendent of public instruction, duly certified and filed with the state auditor. Provided, however, that in case the amount appropriated and available under this

article for the payment of aid to such schools shall in any year be insufficient to apportion to each of such schools as are entitled thereto the full amount intended to be apportioned to state graded schools, state rural schools and state consolidated schools, then, in such case, such amounts as are appropriated and available shall be apportioned pro rata among the schools entitled thereto. Provided, the first annual appropriations herein provided for such shall become available July first, 1911.

Section 13. **Repeal.]** All acts and parts of acts in conflict with this act are hereby repealed.

Approved March 17, 1911.

REQUIREMENTS OF LAW AND THE DEPARTMENT OF EDUCATION.

FIRST CLASS GRADED SCHOOLS.

To be entitled to state aid as a FIRST class graded school, the law and the regulations of this department require:

1. **School Term.** Must be not less than nine months during the school year.

2. **Departments.** To be classified as a graded school of the first class there must be at least 4 departments.

3. **Attendance.** The per cent of attendance must be not less than ninety.

4. **Teachers.** The principal must be a graduate of a state Normal School or higher institution of learning or must hold a professional certificate or a state certificate of the first class. All teachers must hold First grade county or First grade elementary certificates, or certificates of higher rank during the entire school year.

5. **School Buildings.** Must be suitable for school purposes, clean, and well kept. Each school should be provided with foot-scrapers and mats.

6. **Equipment.** Each department must be provided with:

- (a) Blackboards. At least 80 square feet—slate preferred.
- (b) Unabridged Dictionaries. Must be dictionary, recognized as a standard authority.
- (c) Abridged Dictionaries. Several copies—not less than five of an abridged dictionary.
- (d) Supplementary Readers. At least two complete sets of supplementary readers for each class or grade in addition to the regular basic readers.
- (e) Maps. A complete set of at least eight maps, and a state map, mounted on spring rollers in suitable case.
- (f) Globe. A good 12-inch globe—suspension globe preferred.
- (g) Desks. Each room must be equipped with suitable seats and desks, properly arranged, for the accommodation of all pupils, single seats and desks preferred.

- (h) **Drinking Water.** Each department must be supplied with a closed receptacle for the drinking water for the school and with individual drinking cups, unless drinking fountains are supplied.

7. **Course of Study.** The state course of study for rural and graded schools must be followed, including the course in domestic science, manual training and agriculture.

8. **Library.** Each school must have a well selected library of at least 100 volumes to which there must be added yearly books to the amount of at least \$25.00.

9. **Heating and Ventilation.** Each school building must be adequately heated and ventilated in one of the following ways:

- (a) Basement furnace properly installed.
- (b) Patented system of room heating and ventilating, properly constructed and installed.
- (c) Home-made system of room heating and ventilating properly constructed and installed.

10. **Outhouses, Closets.** Unless inside closets are supplied. Each building must have two properly built and well kept outhouses, some distance apart.

11. **School Grounds.** Must be clean and present an orderly and attractive appearance.

12. **Progress.** Each school must show that it has maintained a high standard of efficiency, and has made some improvement during the year.

SECOND CLASS GRADED SCHOOLS.

To be entitled to state aid as a SECOND class graded school, the law and the regulations of this department require:

I. **School Term.** Must be not less than nine months during the school year.

II. **Departments.** To be classified as a graded school of the Second class there must be at least 2 departments.

III. **Attendance.** The per cent of attendance must be not less than ninety.

IV. **Teachers.** The principal must be a graduate of a state Normal School or higher institution of learning or must hold a professional certificate or a state certificate of the first class. All

teachers must hold First grade county or First grade elementary certificates, or certificates of higher rank during the entire school year.

V. **School Buildings...** Must be suitable for school purposes, clean, and well kept. Each school should be provided with foot-scrapers and mats.

VI. **Equipment.** Each department must be provided with:

- (a) Blackboards. At least 80 square feet—slate preferred.
- (b) Unabridged Dictionaries. Must be dictionary, recognized as a standard authority.
- (c) Abridged Dictionaries. Several copies—not less than five of an unabridged dictionary.
- (d) Supplementary Readers. At least two complete sets of supplementary readers for each class or grade in addition to the regular basic readers.
- (e) Maps. A complete set of at least eight maps, and a state map, mounted on spring rollers in suitable case.
- (f) Globe. A good 12-inch globe—suspension globe preferred.
- (g) Desks. Each school room must be equipped with suitable seats and desks, properly arranged, for the accommodation of all pupils, single seats and desks preferred.
- (h) Drinking Water. Each department must be supplied with a closed receptacle for the drinking water for the school and with individual drinking cups, unless drinking fountains are supplied.

VII. **Course of Study.** The state course of study for rural and graded schools must be followed, including the course in domestic science, manual training and agriculture.

VIII. **Library...** Each school must have a well selected library of at least 100 volumes to which there must be added yearly books to the amount of at least \$17.50.

IX. **Heating and Ventilation.** Each school building must be adequately heated and ventilated in one of the following ways:

- (a) Basement furnace properly installed.
- (b) Patented system of room heating and ventilating, properly constructed and installed.
- (c) Home-made system of room heating and ventilating, properly constructed and installed.

X. **Outhouses, Closets.** Unless inside closets are supplied.

Each building must have two properly built and well kept out-houses, some distance apart.

XI. School Grounds. Must be clean and present an orderly and attractive appearance.

XII. Progress. Each school must show that it has maintained a high standard of efficiency, and has made some improvement during the year.

CONSOLIDATED SCHOOLS.

FIRST

To be entitled to state aid as a **SECOND** class consolidated school, the law and the regulations of this department require:

1. **School Term.** Must be not less than nine months during the school year.

2. **Departments.** To be classified as a graded school of the First ⁴ Second class there must be at least 2 departments

3. **Attendance.** The per cent of attendance must be not less than ninety.

4. **Teachers.** The principal must be a graduate of a state Normal School or higher institution of learning or must hold a professional certificate or a state certificate of the first class. All teachers must hold First grade county or First grade elementary certificates, or certificates of higher rank during the entire school year.

5. **School Buildings.** Must be suitable for school purposes, clean, and well kept. Each school should be provided with foot-scrapers and mats.

6. **Equipment.** Each department must be provided with:

- (a) Blackboards. At least 80 square feet—slate preferred.
- (b) Unabridged Dictionaries. Must be a dictionary, recognized as a standard authority.
- (c) Abridged Dictionaries. Several copies—not less than five of an abridged dictionary.
- (d) Supplementary Readers. At least two complete sets of supplementary readers for each class or grade in addition to the regular basic readers.

- (e) **Maps.** A complete set of at least eight maps, and a state map, mounted on spring rollers in suitable ease.
- (f) **Globe.** A good 12-inch globe—suspension globe preferred.
- (g) **Desks.** Each room must be equipped with suitable seats and desks, properly arranged, for the accommodation of all pupils, single seats and desks preferred.
- (h) **Drinking Water.** Each department must be supplied with a closed receptacle for the drinking water for the school and with individual drinking cups, unless drinking fountains are supplied.

7. **Course of Study.** The state course of study for rural and graded schools must be followed, including the course in domestic science, manual training and agriculture.

8. **Library.** Each school must have a well selected library of at least 75 volumes to which there must be added yearly books to the amount of at least \$20.00.

9. **Heating and Ventilation.** Each school building must be adequately heated and ventilated in one of the following ways:

- (a) Basement furnace properly installed.
- (b) Patented system of room heating and ventilating, properly constructed and installed.
- (c) Home-made system of room heating and ventilating, properly constructed and installed.

10. **Outhouses, Closets.** Unless inside closets are supplied. Each building must have two properly built and well kept outhouses, some distance apart.

11. **School Grounds.** Must be clean and present an orderly and attractive appearance.

12. **Progress.** Each school must show that it has maintained a high standard of efficiency, and has made some improvement during the year.

FIRST CLASS RURAL SCHOOL.

To be entitled to state aid as a FIRST class rural school, the law and the regulations of this department require:

1. **School Term.** Must be not less than nine months during the school year.

2. **Attendance.** The per cent of attendance must be not less than ninety.

3. **Teachers.** The teacher must hold a First grade county or a First grade elementary certificate, or one of higher rank during the entire school year.

4. **School Buildings.** Must be suitable for school purposes, clean and well kept. Each school should be provided with foot-scrappers and mats.

5. **Equipment.** Each school must be provided with:

- (a) Blackboards. At least 80 square feet—slate preferred.
- (b) Unabridged Dictionaries. Must be a dictionary, recognized as a standard authority.
- (c) Abridged Dictionaries. Several copies—not less than three of an abridged dictionary.
- (d) Supplementary Readers. At least two complete sets of supplementary readers for each class or grade in addition to the regular basic readers.
- (e) Maps. A complete set of at least eight maps, and a state map, mounted on spring rollers in suitable case.
- (f) Globe. A good 12-inch globe—suspension globe preferred.
- (g) Desks. Each school must be equipped with suitable seats and desks, properly arranged, for the accommodation of all pupils, single seats and desks preferred.
- (h) Drinking Water. Each school must be supplied with a closed receptacle for the drinking water for school and with individual drinking cups.

6. **Course of Study.** The state course of study for rural and graded schools must be followed, including the course in agriculture.

7. **Library.** Each school must have a well selected library of at least fifty volumes to which there must be added yearly books to the amount of at least \$10.00.

8. **Heating and Ventilation...** Each school building must be adequately heated and ventilated in one of the following ways:

- (a) Basement furnace properly intalled.
- (b) Patented system of room heating and ventilating, properly constructed and installed.
- (c) Home-made system of room heating and ventilating, properly constructed and installed.

9. **Outhouses.** Each building must have two properly built and well kept outhouses, some distance apart.

10. **School Grounds.** Must be clean and present an orderly and attractive appearance.

11. **Progress.** Each school must show that it has maintained a high standard of efficiency, and has made some improvement during the year.

SECOND CLASS RURAL SCHOOLS.

To be entitled to state aid as a SECOND class rural school, the law and the regulations of this department require:

1. **School Term.** Must be not less than eight months during the school year.

2. **Attendance.** The per cent of attendance must be not less than ninety.

3. **Teachers.** The teacher must hold a SECOND grade county or a SECOND grade elementary certificate, or one of higher rank during the entire school year.

4. **School Buildings.** Must be suitable for school purposes, clean, and well kept. Each school should be provided with foot-scrapers and mats.

5. **Equipment.** Each school must be provided with:

- (a) Blackboards. At least 80 square feet slate preferred.
- (b) Unabridged Dictionaries. Must be dictionary, recognized as a standard authority.
- (c) Abridged Dictionaries. Several copies— not less than three of an abridged dictionary.
- (d) Supplementary Readers. At least two complete sets of supplementary readers for each class or grade in addition to the regular basic readers.
- (e) Maps. A complete set of at least eight maps, and a state map, mounted on spring rollers in suitable case.
- (f) Globe. A good 12-inch globe—suspension globe preferred.
- (g) Desks. Each school must be equipped with suitable seats and desks, properly arranged, for the accommodation of all pupils, single seats and desks preferred.

- (h) **Drinking Water.** Each school must be supplied with a closed receptacle for the drinking water for school and with individual drinking cups.

6. **Course of Study.** The state course of study for rural and graded schools must be followed, including the course in agriculture.

7. **Library.** Each school must have a well selected library of at least fifty volumes to which there must be added yearly books to the amount of at least \$7.00.

8. **Heating and Ventilation.** Each school building must be adequately heated and ventilated in one of the following ways:

- (a) Basement furnace properly installed.
- (b) Patented system of room heating and ventilating, properly constructed and installed.
- (c) Home-made system of room heating and ventilating, properly constructed and installed.

9. **Outhouses.** Each building must have two properly built and well kept outhouses, some distance apart.

10. **School Grounds.** Must be clean and present an orderly and attractive appearance.

11. **Progress.** Each school must show that it has maintained a high standard of efficiency, and has made some improvement during the year.

HEATING AND VENTILATION.

Among the requirements of the recent law providing for state aid, none is of greater importance than that pertaining to the heating and ventilation of the school house. This is particularly true as applied to the rural school.

One of the most encouraging tendencies in educational affairs is toward the safe-guarding of the health of pupils. Conditions in the school room which affect the physical well-being of the child have a great deal to do with his progress in his studies. It is of vastly greater importance that his health, and therefore his future success and happiness, depend upon these conditions.

Most important of sanitary conditions are those that have to do with heating and ventilation. The school that is heated with a stove is never evenly and uniformly warmed. The floor is generally cold. Children near the stove are over-heated and uncomfortable; they catch cold easily when they go out. Those seated some distance from the stove are chilly, and like the over-heated ones near the stove, are liable to catch cold.

All this is a handicap upon the progress of the pupils. Physical discomfort leads to poor discipline, and makes close application to study almost impossible.

Not only should an even distribution of heat be secured, but a system of ventilation must be provided that will furnish a constant supply of fresh air, without causing drafts.

It is unnecessary to dwell upon the well known fact that air loaded with organic impurity is a source of depression of the physical powers, of nervous disorders and of tubercular diseases.

Scientific tests have shown that when pure air has been taken into the lungs and expelled, its proportion of **oxygen** has been decreased by one-fifth, and its proportion of **carbonic acid** has been increased at least a hundred fold.

When practically the same air is breathed over and over in the school room, its oxygen is soon exhausted; it becomes laden with poisonous gas thrown off from the lungs of each child. Moreover organic poisons and carbonic acid are excreted by the skin.

Unless ever child is perfectly healthy, this air that has been breathed may carry the germs of disease. It is unlikely that the children are all perfectly healthy. While not actually sick, some will carry the germs of contagious diseases at least in a mild form—others will have perhaps only a slight affection of the throat or lungs. The mildest disease germs may work havoc when breathed by a child whose vitality is low and whose power to resist is feeble. The September, 1910, Bulletin of the North Dakota Board of Health warns us that "a single pupil carrying with him any of

the germs of scarlet fever, measles, diphtheria, whooping cough, smallpox, or other diseases of a like nature may readily infect a whole school BEFORE THE TROUBLE IS DETECTED.

The immediate effects of impure air in the school room are thus described by an eminent authority:

"Children become uncomfortable, fretful, dull, irritable and peevish, especially during the last periods. This is by no means due simply to mental fatigue; but body and mind are so depressed by the autotoxic products in the air that the ability to work is lessened. Mental activity relaxes as a result of bodily weariness, which has all the symptoms of poisoning by autotoxic products.

These facts will serve to show the importance of a method of heating that will warm the school room to a temperature of 70 degrees and maintain a more even distribution of heat than is possible with an ordinary stove; and which will afford a constant supply of fresh air while school is in session."

MEANS OF VENTILATION.

In Bulletin No. 15 issued by the Minnesota Department it is said that, "Heating and ventilation both depend upon the circulation of the air. When a room has no ducts for furnishing or drawing off air, circulation is slow and heating laborious. The leakage at doors and windows, and even through the walls, furnishes a meager impetus to the circulation. For that reason it generally requires more time to warm a room which has no means of ventilation than one which has the proper ducts for ventilating. It stands to reason that if heated air can be made to take the place of cold air the heating of the room must take place more rapidly than if the cold air is retained in the room and heated by means of radiation."

There are two means of ventilation; First, the **fan system** which requires mechanical power for forcing the circulation of air; second, the **gravity system**, which keeps the air in circulation through the difference in specific gravity between warm air and cold air.

The fan system is too elaborate and expensive for rural schools. The basement furnace system is likewise beyond reach of most of our smaller school buildings in the state.

The following pages therefore deal principally with the gravity system as applied to a jacketed stove or to a floor furnace. The essentials of such a system are a stove or heater, enclosed within a casing or shield which must be as nearly radiation-proof as possible; ducts which will provide a fresh air inlet and a foul air outlet, both of sufficient capacity to meet the needs of the school room; and dampers by which incoming and outgoing air currents may be regulated or entirely closed.

A gravity system suitable for any school room may be obtained by providing a stove of proper size and shape with a casing and other necessary appliances; or by purchasing a complete system from manufacturers who will install it in the school house.

It is not the purpose of the Department to establish arbitrary rules for the installation of any particular system of heating and ventilating. But it is intended to give directors such information as will guide them in securing the most available and most economical means of heating that will conform to the requirements of the state aid law. Also to state as definitely as possible the requirements that will be enforced by this department in passing upon applications for special aid.

Under separate headings are given, first, requirements for installing casing and ventilating attachments with stoves, which will be referred to as home-made systems; second, complete gravity systems furnished by manufacturers, which are referred to as patented systems; and, third, basement furnaces.

STOVE HEATING WITH HOME-MADE VENTILATING APPARATUS.

Experience with jacketed stoves in schools throughout the Northwest indicates that home-made systems can safely be approved only when installed according to the following recommendations:

Chimney. The chimney should be built entirely inside the building, or at least with not more than one side exposed. It should have a single flue not less than 20in. x 20in. inside measurement. It should be built from the ground up, resting on a solid foundation, and extending at least 4 feet above the highest portion of the roof.

Construct a stack inside the chimney to serve as a smoke flue; this stack should be 8 inches in diameter, made of No. 16 gauge steel. Rest the stack on the floor of chimney; provide side braces to hold it in place; extend it 2 feet above chimney top, and place a cap above the opening to exclude moisture; construct a clean-out at the bottom of stack for the removal of soot; place a "T" in the stack for connecting smoke pipe at the usual height above the floor.

Foul air will pass out through the space surrounding the steel stack inside the chimney; the heat of the stack develops the necessary upward draft. Double-flue brick chimneys—using one flue for smoke and the other for ventilation—do not give satisfactory results.

Foul air Outlet. The opening in chimney which admits the foul air current should be fitted with a register. This register should have an area at least equal to the cross-sectional area of chimney flue; cast iron registers should have an area about one-

fourth greater owing to the obstruction offered by the register face. Two registers may be placed in the chimney to secure the necessary area. The bottom of outlet register must be placed at the floor line.

Stove: The stove should be of the Round Oak type, of heavy construction, without rims or other projections, and with a small base. A base burner should never be used for this purposes. For rooms of moderate size the fire pot should not be less than 20in. in diameter.

Shield: The stove must be enclosed within a shield or casing; to be made of Russian iron or plated steel, with a lining if asbestos and an inside lining of corrugated tin to make it as nearly radiation-proof as possible. There should be not less than 8 inches space between stove and casing; bottom of casing should be not less than 8 inches and not more than 14 inches above the floor; top of casing should be not more than from 6 to 10 inches above top of stove.

A casing resting on the floor, with an opening in the base for admitting circulation of air, will not prove satisfactory.

Fresh Air Intake: The fresh-air intake shall have an area as great at least as that of the foul-air flue, exclusive of the smoke stack. It must not diminish in size toward the inside. The opening outside of the building should be screened, and should be provided, either with a series of slats for deflecting wind and rain, or with a hood or elbow.

The intake pipe must so enter the space between shield and stove as to insure that the fresh air will be thoroughly warmed before it finds its way into the room. It has been proved that a fresh-air register under the stove does not do the work intended, and this would not, therefore, be accepted as meeting the requirements. Such registers tend to spread cold air over the floor before it is heated.

To insure the best results, it is recommended that in constructing an intake for a home-made system a heavy galvanized pipe shall be placed underneath the floor to a point below the stove. Provide an extension or fitting which shall reach up inside the casing, the opening being at least 4 inches above bottom of casing. A damper should be provided in the foul-air pipe by which it may be closed.

PATENTED GRAVITY SYSTEMS.

For all systems which combine the smoke and foul air currents in a single chimney flue, this flue shall be not less than 12in x16 in. clear on the inside throughout its entire length.

The foul-air ventilator leading into the chimney shall be at least the equivalent of 12 inches in diameter.

The fresh-air intake shall be as large, at least, as the foul-air ventilator, and preferably larger. The requirements for the con-

struction of the casing and its adjustment to the heater, and for introducing fresh air at a point above bottom of casing, are the same as those set forth in regard to home-made systems.

BASEMENT PLANTS.

1. **Steam.** This is practicable only in the larger buildings, and whenever possible, a fan should be used in connection in order to insure abundant and steady ventilation. When steam is used in connection with a gravity system of ventilation, the following requirements should be observed:
 - (a) The fresh air must be brought into the building through a stack of steam coils placed in the intake in the basement. This stack of coils should have ample heating capacity to heat the air to at least a temperature of 80 degrees in the coldest weather before it is discharged to the different school rooms.
 - (b) The flues admitting the warm fresh air to the school rooms must have a horizontal cross-section area of not less than one square foot for every ten persons that the room will accommodate.
 - (c) The Fresh Air flues should open into the school room through an opening in the wall about seven feet from the floor, and **not through registers in the floor.**
 - (d) Each room must be provided with foul air flues of approximately the same size as the fresh air flues, and must be located on the same side of the room.
 - (e) Each foul air flue must be provided with steam coils so as to produce sufficient heat to induct a strong upward current of the air in the flue.
 - (f) Registers in the foul air flue must be large enough to allow for grill work, and the lower edge of the register must be level with the floor.
2. **Furnace.**

If a basement hot air furnace is installed, it should be of ample capacity so that it will not need to be crowded, even in the coldest weather. In installing a furnace, the following requirements must be observed:

- (a) Fresh air must be brought into the building through the basement and heated before it is sent to the rooms.

- (b) A hot air flue leading from the furnace to the school rooms should be made of brick, or heavy galvanized iron covered with asbestos, and should have a cross-section area of not less than 20x20 inches for each room of ordinary size. For extremely large rooms, correspondingly larger flues should be used.
- (c) The hot air flues should open into the school room through an opening in the wall about seven feet from the floor. **In no case should the hot air be brought into the room through registers in the floor.**
- (d) When the building consists of only one or two rooms, then the most convenient way for removing the foul air is by means of a large chimney with a steel stack 8 inches in diameter in the center. Such a chimney should be at least 20x20 inches clear on the inside for a single room, and correspondingly larger for a two-room building. The registers should be placed in this chimney, so that the lower edge of register in each case will be on a level with the floor. The fresh and foul air flues must be on the same side of the room.
- (e) Experience seems to indicate that it is more or less unsatisfactory to try to heat and ventilate a school building of more than two rooms with a hot air basement furnace, but when this is undertaken a foul air flue of the required size should be provided for each school room. These foul air flues should be so located that as far as possible, they may be between or adjacent to a hot air flue.

GENERAL SUGGESTIONS.

Condition of Building. Under no conditions will a system ventilate the school room properly if any considerable quantity of air is permitted to enter the room through windows and doors, openings in the floor or in the ceiling. Tight walls and ceilings, tight floors, and close fitting doors and windows are essential to the proper working of air inlets and outlets connected with any system.

Cost of Fuel. Where the common stove is to be replaced by a system that will change the air several times every hour, school boards need not worry overmuch about the added cost of fuel. Often no more fuel is necessary, and this is the explanation: When the room is heated by a stove or furnace without any at-

tachment for changing the air, then, in order to maintain the desired temperature in the space within six feet of the floor occupied by the teacher and pupils, the air above and to the ceiling is of necessity much hotter, and a waste of heat is thus entailed. A good system forces the cold air out from off the floor, and draws the hot air down, making the temperature near ceiling and floor practically uniform, and calling for a lower average temperature than a system that does not evenly distribute the heat.

A Caution. When a home-made system is put in, great care should be exercised to see that it is properly constructed and installed; otherwise it may fail to give satisfactory results.

In Minnesota, where gravity systems have been in use for several years, the Department of Public Instruction offers this suggestion in its Bulletin to School Boards:

"Probably the best and easiest way for a board of education to get a good system of heating and ventilation is for it, after conference with the county superintendent, to make the purchase from a firm of unquestioned reliability, which will install a system under a rigid guaranty to do the work. Then the county superintendent can test the system with the anemometer and thermometer before the board pays for it."

The above paragraph is followed by quoting this advice from State Superintendent Cary of Wisconsin—another state in which a great many gravity systems are in use:

"The board members should be constantly on their guard against cheap and unsatisfactory ventilating apparatus recommended by persons not regularly engaged in the business of supplying such appliances. The home-made appliances devised by local dealers cannot be safely relied upon. It is practically useless to pay out money for the installment of any kind of heating and ventilating apparatus unless the arrangements and appliances for its successful operation are provided."

In all districts applying for State Aid the board and teachers must be able to show that there has been strict compliance with each and every provision of law regarding the teaching of special subjects, the construction of proper outbuildings, the placing of fire-escapes and the care of school grounds.

School boards are urged to procure suitable plans for school houses before contracts for new buildings are let. We recommend that a competent architect be employed and that his compensation be agreed upon in writing before any services are rendered.

In the preparation of this pamphlet we are indebted to Supt. C. G. Schultz of Minnesota and Supt C. P. Cary of Wisconsin.

Respectfully submitted,

E. J. TAYLOR,
Supt. Public Instruction.

Bismarck, N. Dak., August 1st, 1911



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